

PATENT APPLICATION

RATCHET WRENCH HEAD MEMBER AND SYSTEM

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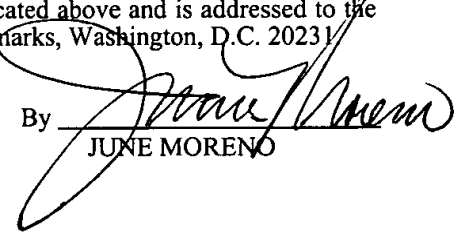
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Date of Deposit: December 17, 2001 By

JUNE MORENO

Label No.: ET205573068US



10022503 121701

Patent Application of  
Diego Cerda  
for  
Ratchet Wrench Head Member and System

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CROSS REFERENCE TO OTHER APPLICATIONS

This is a divisional application of US Patent Application Number 09/047010, with a  
filing date of March 24, 1998, which further claims the benefit of the priority date of  
10 provisional patent application serial number 60/044,075 filed on April 17, 1997.

FIELD OF THE INVENTION

The present invention relates generally to an improved wrench head member, the wrench  
15 head member may be a part of a wrench system which is lighter and more compact than  
previous systems.

BACKGROUND OF THE INVENTION

20 Wrenches of assorted sizes and shapes have existed for decades. Most tool sets are bulky  
and of significant weight. A standard tool set has multiple handles, socket extensions,  
sockets, etc. Carrying or storing a full set of tools may be difficult due to its bulk and  
significant weight. In order to reduce the weight, the tool industry offers ratchet systems  
with a drive which fits several different socket extension. This allows a single handle to  
25 be used for several different configurations. However, there are still many bulky pieces  
which are redundant for any particular configuration.

To address the problems listed above, universal wrenches have been designed which fit  
multiple size bolts. There are several different variations of this type of device. One  
30 version has a rotatable head which rotates in relation to the handle to engage the bolt  
between the head and the handle as the user begins to twist the wrench. Another version

has a sliding member which adjusts to the diameter of the bolt. Typically, these wrenches are more difficult to use, especially in situations where a 360° area surrounding the bolt is not free of interfering objects.

- 5 Another tool is a device sold by Mac Tools listed as part number W3R (Ratchet Head Only) and W30 H (Attachment Handle). The W3R device is a ratchet head which has a hollow round extension for a cylindrical handle. The extension has an opening for a locking button. The locking button on the handle is depressed with a screwdriver or other rigid device as the handle is inserted into hollow. When the handle is inserted and  
10 properly orientated, the locking button pops up into the opening in the extension. To remove the handle, a screw driver or other small, relatively rigid member is used to force the locking ball down as the handle is pulled out of the hollow. In order to maintain the locking ball within the opening, the movement of the ball must be extremely stiff, otherwise the handle would be prone to rotation within the hollow. Further, this device  
15 still requires the same number and variety of pieces and, therefore, would have the same problems with bulk and weight.

#### SUMMARY OF THE INVENTION

- 20 One embodiment of the present invention takes the form of a wrench head member having an attachment extension which allows the user to attach the wrench head member to a handle. In a preferred embodiment, the extension is a collar extending from the side of the wrench head member and having one or two holes extending through the sidewall of a hollowed section. The hollowed section is configured to engage a standard socket  
25 extension. Alternately, the wrench head member may have a post which engages a hollow within a handle member.

The wrench head member may also form part of a multi-piece, light-weight wrench system which provides a stable engagement between the assembled pieces of the wrench.

- 30 The wrench is formed of two pieces: the wrench head member and a handle member. The wrench head member has an attachment extension which allows the user to attach the

10022603-121701 wrench head member to the handle. Although any elongate member may be used, the handle is preferably a socket extension. The attachment between the handle and the wrench head member is a male/female connection. Preferably, the wrench head is the female member having a collar extending from the side of the wrench head and having a pair of holes extending through the sidewall of the collar for the locking ball and release button on a socket extension. However, if preferred, the wrench head member may be the male member and the socket extension may be a modified version which provides a hollowed channel for a post extending from the wrench head member. Other variations and advantages of the invention will no doubt occur to those skilled in the art upon reading and understanding the following detailed description along with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view of a quick-release ratchet wrench head member embodiment.

Figure 2 is a top view of the quick-release ratchet wrench head member embodiment.

Figure 3 is a top perspective view of the quick-release ratchet wrench head member embodiment.

Figure 4 is a side view of the quick-release ratchet wrench head member attached to a modified socket extension.

Figures 5A-D are side views of assorted socket extensions.

Figure 6 is a side view of a wrench head member having two opposing drives.

Figures 7A and B are front and side views of a closed-end, box ratchet wrench head member embodiment.

Figures 8A and B are front and side views of a flexible head, closed-end, box ratchet wrench head member embodiment.

Figures 9A and B are front and side views of an alternate closed-end, box ratchet wrench head member embodiment.

Figures 10A and B are front and side views of a closed-end, box ratchet wrench embodiment.

Figures 11A and B are front and side views of a closed-end, box ratchet wrench head member embodiment.

Figures 12A and B are front and side views of a quick-release, closed-end, box ratchet wrench head member embodiment.

#### DETAILED DESCRIPTION OF THE INVENTION

Figures 1, 2, and 3 are side, top, and perspective views, respectively, of a quick-release ratchet wrench head member 20. In this embodiment, the wrench head member 20 has a quick-release button 22 which actuates the locking ball 54 on the drive 52 of a socket extension 50 (see figures 4 and 5A-5D). Extension collar 28 extends from the base 26 of the wrench head 24. The lower portion 30 of the collar 28 is hollow and is configured to engage a socket extension 50. There are two sections of the hollowed portion 32: a drive hollow section 34 and a shaft hollow section 36. Closest to the wrench head 24 is the drive hollow 34, a square section which is configured to engage the drive 52 of the socket extension 50. Connecting to the drive hollow 34 is the shaft hollow 36 which is preferably round and configured to engage the shaft 58 of the socket extension 50. Optionally, the drive hollow 34 may be formed in alternate configurations such as hexagonal, star-shaped, etc. The only requirement is that the connection between the drive 52 and the drive hollow 34 inhibited turning within the collar 28.

A locking hole 38 is located through the sidewall 35 of the drive hollow 34 and is configured to engage the locking ball 54 on the socket extension drive 52. A release hole 40 is located through the sidewall 37 of the shaft hollow 36. The release hole 40 is for use with quick-release socket extensions 50 which have a release button 56 on the shaft 58 which, when depressed, allows the locking ball 54 on the drive 52 of the socket extension 50 to depress.

In the present embodiment, the release hole 40 is a wide shallow hole to allow easy access for a user's thumb or finger. In alternate embodiments, the sides of release hole 40 may have different slopes or shapes to fit particular uses or tools.

Figure 4 is a side view of the first ratchet wrench head member 20 attached to a modified quick-release socket extension 48. The drive end 52 of the socket extension 48 is received within the hollowed portion 32 of the collar 28. The collar 28 of the wrench head member 20 provides a stable engagement between the socket extension 48 and the wrench head member 20. The locking ball 54 is locked within the locking hole 72 and prevents the socket extension 48 from pulling out of the wrench head member 20 unless the release button is depressed. The engagement between the drive 52 and the drive hollow 34 prevent the socket extension 48 from rotation within the collar 28. The overall engagement between the hollowed portion 32 and the drive 52 and shaft 58 of the socket extension 48 transfer the torque forces from the socket extension 48 to the wrench head 24. Currently, the collar 28 is between 1.0 and 4.0 inches in length, preferably between 1.5 and 3.0 inches, most preferred between 1.5 and 2.0 inches. However, alternate embodiments may have longer or shorter collars 28 to provide the amount of stability necessary.

The locking ball 54 on the drive 52 is released by pressing a finger or thumb through the release hole 40 to depress the release button 56 on the shaft 58 of the socket extension 48.

This embodiment of socket extension 48 is modified to fit a second socket extension 50 into its base 60. The base 60 of the socket extension 48 is a hollow 62 having two sections: a drive hollow 64 and a shaft hollow 68. Once again, a locking hole 72 passes

through the sidewall 66 of the drive hollow 64 and a release hole 74 passes through the sidewall 70 of the shaft hollow 68. If desired, a user could place the drive 52 of a second socket extension 48 into the hollow 62 to form a longer handle, thereby increasing the lever arm to increase the amount of rotational force applied to the wrench head 24 without increasing the force exerted by the user.

Figures 5A-D are side views of assorted prior art socket extensions 50 which may be used with the present invention. The set of socket extensions 50 shown are of the release style having a release button 56 which a user presses to release the locking ball 54 on the drive 52. However, any type of socket extension 50 may be used with the present invention.

Figure 6 is a side view of a wrench head member 80 having two opposing drives 82. This style wrench head member 80 has two drives 82 that may be of the same or differing sizes. At the base 86 of the wrench head 84 is a collar 88 having a hollowed portion 90 configured to hold a socket extension 50 similar to the embodiment shown in figures 1-3. Figures 7A and B are front and side views of a closed-end, box ratchet wrench head member 100. The box may have any number of points to form the opening and may be fitted with a socket drive if desired. At the base of the wrench head member 100 is a collar 102 having a hollow 104 with two sections: a drive hollow 106 and a shaft hollow 108. In this configuration, the end of the shaft hollow 108 is tapered. The tapered section 110 guides the socket extension 50 into the hollowed portion 104 to facilitate easy insertion of the socket extension 50. The release button hole 112 has a steeper sidewall angle and has a circular shape for ease of manufacturing.

Figures 8A and B are front and side views of a flexible head, closed-end, box ratchet wrench head member 120 which is a variation of the embodiment shown in figures 7A and B, but with the collar 122 connected to the wrench head 124 by a pivot 126 which pivots around a pivot point. The pivot 126 allows the user to choose the angle between the wrench head 124 and the collar 122, thereby choosing the angle between the wrench head 124 and the handle.

Figures 9A and B are front and side views of an alternate closed-end, box ratchet wrench head member 130 which is a variation of the embodiment previously described and shown in figures 7A and B. In this case, the release button opening is a slot 132 extending from the end 136 of the collar 134. In the design shown, the slot 132 is tapered to guide the socket extension 50 into place within the hollowed portions 138, 140. The slot also assists the user in aligning the square drive 52 of the socket extension 50 with the square drive hollow 138. In alternate embodiments, the slot 132 may be a different shape for utilitarian or design purposes.

Figures 10A and B are front and side views of a closed-end, box ratchet wrench head member 150. The configuration shown is used with an alternate version of the socket extension, a version of which is shown as the base 60 of the socket extension seen in figure 4. In this version, the wrench head 152 is attached to a post 154 which is configured to fit within a hollowed end 62 of a socket extension 50. The hollowed portion of the socket extension would have openings to accommodate the locking ball 156 and the release button 158.

Figures 11A and B are front and side views of an closed-end, box ratchet wrench head member 160 which is a variation of the embodiment shown in figures 10A and B. The wrench head 162 is connected to a post 164 which has a locking ball 166 located thereon. The socket extension 50 which corresponds to this embodiment 160 has an opening configured to engage the post 164 and locking ball 166.

Figures 12A and B are front and side views of a quick-release, closed-end, box ratchet wrench head member 170. In this embodiment 170, the quick-release button 174 is located below the wrench head 172 and above the attaching collar 176. The attaching collar 176 has two holes: a locking ball opening 184 and a release button opening 186. These two openings 184, 186 lead into a hollow similar to those seen in other embodiments described herein.



The present invention is preferably forged steel, however alternate materials may also be used such as aluminum, and plastic with or without reinforcing, and alternate fabrication processes may be used such as casting, molding, machining, etc. depending on the strength and weight requirements.

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The present invention is currently envisioned as a replacement for the traditional wrenches handle assemblies in a standard wrench set and may be in standard sizes or dimensions such as 1/4", 3/8", 1/2", and 3/4". However, the dimensions may be increased or decreased or otherwise varied for alternate applications.

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Although the examples given include many specificities, they are intended as illustrative of only one possible embodiment of the invention. Other embodiments and modifications will, no doubt, occur to those skilled in the art. For example, features have been listed with particular configurations. Any one or more of the features may be added to or combined with any of the other embodiments or other standard tools to create alternate combinations and embodiments. Thus, the examples given should only be interpreted as illustrations of some of the preferred embodiments of the invention, and the full scope of the invention should be determined by the appended claims and their legal equivalents.

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